IN THE CLAIMS AMEND

1. (Original) A projection exposure apparatus for microlithography comprising:

a) a light source;

b) an illumination system;

c) a mask-positioning system;

d) a projection lens having a system aperture plane and an image plane and comprising at least one lens made of a material which has a birefringence dependent on the transmission angle;

e) an object-positioning system;

d) an optical element, which

- has a position-dependent polarization-rotating effect or a position-dependent birefringence,
- compensates at least partially for the birefringent effects produced in the image plane by the at least one lens, and which
- is provided close to a pupil plane of the projection exposure apparatus.

2. (Original) The projection exposure apparatus according to Claim 1, wherein the pupil plane is in the illumination system.

3. (Original) The projection exposure apparatus according to Claim 1, wherein the pupil plane is in the projection lens.

4. (Original) The projection exposure apparatus according to Claim 1, wherein

projection light produced by the light source has a wavelength in the range from about 250 nm to about 100 nm.

5. (Original) The projection exposure apparatus according to Claim 1, wherein the projection lens has a numerical aperture on the image side in the range from 0.7 to 0.95.

6. (Original) The projection exposure apparatus according to Claim 1, wherein the optical element is arranged close to the image plane.

7. (Original) The projection exposure apparatus according to Claim 1, wherein the material of the at least one lens is a cubic fluoride crystal, in particular CaF_2, BaF_2 or SrF_2.

8. (Original) The projection exposure apparatus according to Claim 1, wherein the birefringence dependent on the transmission angle on the one hand and the position-dependent polarization-rotating effect or position-dependent birefringence on the other hand have the same manifold, in particular threefold or fourfold, rotational symmetry.

9. (Original) The projection exposure apparatus according to Claim 1, wherein the at least one lens is arranged between the system aperture plane and the image plane.

10. (Original) The projection exposure apparatus according to Claim 4, wherein the at least one lens is a final lens on an image side of the projection lens.

11. (Original) The projection exposure apparatus according to Claim 1, wherein the optical element is arranged close to a system aperture plane of the projection lens.

12. (Original) The projection exposure apparatus according to Claim 1, wherein the optical element is an optically active element, in particular made of quartz.

13. (Original) The projection exposure apparatus according to Claim 1, wherein the optical element is a birefringent element with locally varying thickness.

14. (Original) The projection exposure apparatus according to Claim 1, wherein tangential or radial polarization exists in the image plane.

15. (Original) The projection exposure apparatus according to Claim 14, wherein a polarization is produced in the illumination system or in a part of the projection lens on an object side, and wherein an optically active element is arranged close to a system aperture plane, said optically active element causing, by a suitable local thickness distribution, a polarization rotation to the tangential polarization with superimposed compensation for the birefringent effects produced by the at least one lens.

16. (Original) A projection lens for a projection exposure apparatus, said projection lens comprising:

a) at least one first optical element that

- is arranged close to a field plane and
- causes a perturbation of a transmitted light beam, said perturbation depending on the polarization and the angle of light rays constituting the light beam;

b) at least one second optical element that

  - is arranged close to a pupil plane Fourier-transformed with respect to the field plane and
  - has an influence on the polarization of the light rays depending on their position at the at least one second optical element such that the perturbation caused by the at least one first optical element is compensated for at least partially.

17. (Original) The projection lens according to Claim 16, wherein the perturbation caused by the at least one first optical element and the influence on the polarization of the at least one second optical element have the same manifold, in particular threefold or fourfold, rotational symmetry.

18. (Original) The projection lens according to Claim 16, wherein the at least one first and the at least one second optical elements are rotated with respect to one another about a common symmetry axis so that the rotation-angle ranges of maximum birefringence for the at least one first and the at least one second elements are mutually offset.

19. (Original) The projection lens according to Claim 16, wherein the at least one second optical element influences the polarization of the light rays by stress-induced and position-dependent rotation of the polarization.

20. (Original) The projection lens according to Claim 16, wherein the at least one second optical element influences the polarization of the light rays by a stress-induced position-dependent birefringence.

21. (Original) The projection lens according to Claim 19 or 20, wherein the at least one second optical element is coupled to a force-inducing device for changing the influence on the polarization of the light rays.

22. (Original) The projection lens according to Claim 21, wherein the force-inducing device has at least one piezo-actuator.

23. (Original) The projection lens according to Claim 21, wherein the force-inducing device acts on a circumferential surface the at least one second optical element without causing flexural deformation thereof.

24. (Original) The projection lens according to Claim 21, wherein the force-inducing device has a force-inducing component which acts on the at least one second optical element via force-inducing bodies on at least two force-inducing positions so that the resultant of forces

which act on the at least one second optical element via the force-inducing positions extends in a neutral surface containing neutral fibres of the at least one second optical element.

25. (Original) The projection lens according to Claim 24, wherein at least one force-inducing body comprises a bearing body, via which the at least one force-inducing body bears on the respective force-inducing position, said bearing body being designed to be movable so that the bearing body can be aligned with the respective force-inducing position.

26. (Original) The projection lens according to Claim 25, wherein the bearing body is fitted via a spring on a base body of the at least one force-inducing body.

27. (Original) The projection lens according to Claim 25, wherein the bearing body is fitted on a base body of the at least one force-inducing body via at least one hinge.

28. (Original) The projection lens according to Claim 25, wherein the bearing body is connected to a base body of the at least one force-inducing body via at least one movable solid-state hinge.

29. (Original) The projection lens according to Claim 28, wherein the bearing body acts on the at least one second optical element via a force-inducing position extended in the circumferential direction of the at least one second optical element or via at least two force-inducing positions offset in the circumferential direction of the at least one optical element, the bearing body inducing a bearing force in the at least one second optical element which varies in

the circumferential direction of the at least one second optical element.

30. (Original) The projection lens according to Claim 29, wherein the bearing body has a flexural stiffness which varies in the circumferential direction of the at least one second optical element.

31. (Original) The projection lens according to Claim 24, wherein the bearing body induces a force in the at least one second optical element, which varies in the circumferential direction of the at least one second optical element, via at least two spring bodies with predetermined spring strengths offset in the circumferential direction of the at least one second optical element.

32. (Original) The projection lens according to Claim 24, wherein a force-inducing component has exactly two force-inducing bodies, the force-inducing positions of which are arranged outside the neutral surface of the optical element.

33. (Original) The projection lens according to Claim 32, wherein the two force-inducing bodies are connected to one another via a hinge and each comprise a first lever arm being formed between the hinge and the respective force-inducing position and a second lever arm on which an actuator engages.

34. (Original) The projection lens according to Claim 33, wherein the two force-inducing bodies are designed in the manner of tongs, a single actuator being arranged between the two

second lever arms of the force-inducing bodies and acting simultaneously on both second lever arms.

35. (Original) The projection lens according to Claim 32, wherein each force-inducing body is assigned at least one actuator for controlling the force induction in the at least one second optical element.

36. (Original) The projection lens according to Claim 35, comprising at least one actuator having a shear action and acting between the force-inducing body and a frame-fixed constituent of a frame of the at least one second optical element.

37. (Original) The projection lens according to Claim 24, comprising a force-inducing component having a force-inducing body with at least two force-inducing positions, which are arranged offset in the direction of the optical axis of the at least one second optical element.

38. (Original) The projection lens according to Claim 37, comprising an actuator, which is arranged displaceably in the direction of the optical axis of the at least one second optical element, acting on the force-inducing bodies radially with respect to the at least one second optical element.

39. (Original) The projection lens according to Claim 38, comprising a reaction body, formed as a ring around the at least one second optical element, for the actuator.

40. (Original) The projection lens according to Claim 21, wherein the force-inducing device is dynamically acting.

41. (Original) The projection lens according to Claim 40, wherein the force-inducing device is designed so that it acts with a predetermined frequency on the at least one second optical element.

42. (Original) The projection lens according to Claim 41, wherein the frequency of the force-inducing device lies in the range of the resonant frequency of the body oscillation of the at least one second optical element.

43. (Original) The projection lens according to Claim 40, wherein the force-inducing device is designed so that it produces a sound-wave profile inside the at least one second optical element, the distribution of which corresponds to a predetermined superposition of Zernike functions.

44. (Original) The projection lens according to Claim 43, wherein a standing sound wave is produced in the at least one second optical element by the force-inducing device.

45. (Original) The projection lens according to Claim 43, wherein a traveling sound wave is produced in the at least one second optical element by the force-inducing device.

46. (Original) A projection exposure apparatus comprising a projection lens according to

Claim 16.

47. (Original) A projection exposure apparatus comprising a light source and a projection lens according to Claim 40, wherein the light source is designed so that it emits an intermittent projection-light beam, and wherein the force-inducing device is designed so that it acts intermittently on the optical element in-time with the projection-light beam.

48. (Original) The projection exposure apparatus according to Claim 47, comprising a control device for synchronizing the force-inducing device with the light source.

49. (Original) A method for producing a microlithography projection lens in which the lens is mounted completely and the wavefront in the image plane is analyzed, wherein a manifold rotationally symmetric perturbation is evaluated and, as a function thereof, the thickness profile of an optical element, which is arranged close to the pupil, is changed with the same manifold rotational symmetry so that the manifold rotationally symmetric perturbation of the wavefront is compensated for at least partially in the image plane.

50. (Original) The production method according to Claim 49, wherein the microlithography projection lens is a lens according to Claim 16.

51. (Currently Amended) A microlithographic structuring method~~ using a pro-jection exposure apparatus according to Claim 1~~, comprising the steps of:

a) providing a projection exposure apparatus according to Claim 1;

b) illuminating a reticle using the illumination system; and

c) imaging the reticle on an object using the projection lens.